

AMENDMENTS TO THE CLAIMS

1. (**Currently Amended**) An organometallic precursor represented by following Formula 1, for forming a metal film or pattern:

Formula 1

{wherein,

M is a ~~transition-metal~~ metal selected from the group consisting of Ag, Au, Cu, Pd, Pt, Os, Rh, Ni, Cd, Ir, and Fe; L' is a neutral ligand;

X is an anion that may coordinate the transition metal;

m is an integer of 1 to 10, provided that when m is two or more, each M may or may not be same as each other;

p is an integer of 0 to 40, and q is an integer of 0 to 10, provided that when p or q is two or higher, L's or Xs are independently identical or different with one another, and p and q are not 0 at the same time; and

L is a hydrazine compound coordinating to the transition metal, represented by following Formula 2:

Formula 2

[wherein,

R₁, R₂, R₃ and R₄ are independently hydrogen; alkyl or aryl of 1 to 20 carbon atoms having at least one substitution ~~groups; group;~~ or $R_5 \overset{\text{O}}{\underset{\text{||}}{\text{C}}}^-$, provided that the at least one substitution ~~groups are group~~ is selected from the group consisting of halogen ~~groups including~~ F, Cl, ~~Br or I~~, amine ~~groups~~, hydroxyl ~~groups~~, -SH(sulfhydryl) ~~groups~~, cyano ~~groups~~, sulphonic acid ~~groups~~ (SO₃H), R₆S-, R₆O- (R₆ is an alkyl or aryl group containing 1 to 20 carbons), $R_5 \overset{\text{O}}{\underset{\text{||}}{\text{C}}}^-$, and nitrile ~~groups~~, and R₅ is R', R'₂N, or R'O (R' is hydrogen, or an alkyl or aryl group containing

1 to 20 carbons)]; and

n is an integer of 1 to 40, provided that when n is two or more, Ls are independently identical or different with one another}.

2. **(Currently Amended)** The organometallic precursor as set forth in Claim 1, wherein ~~M is a metal selected from the group consisting of Ag, Au, Cu, Pd, Pt, Os, Rh, Co, Ni, Cd, Ir, and Fe;~~ L' is a ligand bonded to the metal, containing at least one donor atom ~~atoms including N, P, As, O, S, Se, or Te and~~ having 20 or less carbons; and X is one or more anion that can coordinate a metal atom, the anion being selected from the group consisting of OH⁻, CN⁻, NO₂⁻, NO₃⁻, halide (F⁻, Cl⁻, Br⁻, ~~or I⁻~~), trifluoroacetate, isothiocyanate, tetraalkylborate (~~BR₄⁻; R is Me, Et or Ph~~), tetrahaloborate (~~BX₄⁻; X is F or Br~~), hexafluoro phosphate (PF₆⁻), triflate (CF₃SO₃⁻), tosylate (Ts⁻), sulphate (SO₄²⁻), carbonate (CO₃²⁻), acetylacetonate, trifluoroantimonate (SbF₆⁻), and an anion containing hydrazine group.

3. **(Currently Amended)** The organometallic precursor as set forth in claim 1, wherein L' is at least one selected from the group consisting of ~~amines; alcohols; phosphines; phosphites; or phosphine oxides; arsines; thiols; carbonyl compounds; alkenes; alkynes; and arenes~~ amine; alcohol; phosphine; phosphite; phosphine oxide; arsine; thiol; carbonyl compound; alkene; alkyne; or arene.

4. **(Original)** The organometallic precursor as set forth in Claim 1 or 2, wherein the organometallic precursor represented by the Formula 1 is Ag(CF₃COO)CH₃CONHNH₂, Ag(CF₃COO)t-butylcarbазate, Ag(CF₃COO)benzoichydrazide, Ag(BF₄)CH₃CONHNH₂, Ag(SbF₆)CH₃CONHNH₂, Ag(SO₃CF₃)CH₃CONHNH₂, or Ag(NO₃)CH₃CONHNH₂.

5. **(Currently Amended)** A composition for forming a metal film or pattern, which comprises a hydrazine compound represented by following Formula 2 and an organometallic compound represented by following Formula 3:

Formula 2

{wherein,

R_1 , R_2 , R_3 and R_4 are independently hydrogen; alkyl or aryl of 1 to 20 carbon atoms having at least one substitution ~~group-groups~~; or $R_5\overset{\text{O}}{\underset{\text{H}}{\text{C}}}-$, provided that the at least one substitution ~~group is groups~~ are selected from the group consisting of halogen ~~groups including F, Cl, Br or I,~~ amine ~~groups~~, hydroxyl ~~groups~~, -SH(sulfhydryl) ~~groups~~, cyano ~~groups~~, sulphonic acid ~~groups~~ (SO_3H), $\text{R}_6\text{S}-$, $\text{R}_6\text{O}-$ (R_6 is an alkyl or aryl group containing 1 to 20 carbons), $\text{R}_5\overset{\text{O}}{\underset{\text{H}}{\text{C}}}-$, and nitrile groups, and R_5 is R' , $\text{R}'_2\text{N}$, or $\text{R}'\text{O}$ (R' is hydrogen, or an alkyl or aryl group containing 1 to 20 carbons)); and,

Formula 3

{wherein,

M is a transition metal; L' is a neutral ligand;

X is an anion that can coordinate the transition metal;

m is an integer of one to ten, provided that when m is two or more, each M may or may not be same as each other; and

p is an integer of 0 to 40, and q is an integer of 0 to 10, provided that when p or q is two or higher, L' s or X s are independently identical or different with one another, and p and q are not 0 at the same time}.

6. **(Original)** A method of forming a metal film or pattern using a solution of the organometallic precursor of claim 1 or the composition of claim 5 with heat treatment.

7. **(Original)** The method as set forth in claim 6, wherein forming the metal film or pattern is performed by i) producing a pattern through a microcontact printing, a micro molding in capillary (MIMIC), an imprinting, an ink-jet printing, or a silk-screen, and ii) heating the

pattern.

8. **(Currently Amended)** The method as set forth in claim 6, wherein the solution of organometallic precursor ~~of claim 1~~ or the composition ~~of claim 5~~ is prepared by dissolving the organometallic precursor or the composition in a solvent selected from the group consisting of nitriles including ~~acetonitrile, propionitrile, pentanenitrile, hexanenitrile, heptanenitrile, and isobutylnitrile~~; aliphatic hydrocarbons including ~~hexane, heptane, octane, and dodecane~~; aromatic hydrocarbons including ~~anisole, mesitylene, and xylene~~; ketones including ~~methyl isobutyl ketone, 1-methyl-2-pyrrolidinone, cyclohexanone, and acetone~~; ethers including ~~tetrahydrofuran, diisobutyl ether, and isopropyl ether~~; acetates including ~~ethyl acetate, butyl acetate, and propylene glycol methyl ether acetate~~; alcohols including ~~isopropyl alcohol, butyl alcohol, hexyl alcohol, and octyl alcohol~~; inorganic solvents; and a mixture thereof.

9. **(Currently Amended)** The method as set forth in claim 6, wherein the method comprises the steps of i) dissolving the organometallic precursor ~~of claim 1~~ or the composition ~~of claim 5~~ in a first solvent to produce a solution and coating the solution on a substrate; ii) partially heat-treating the solution coated on the substrate at 400°C or lower; and iii) developing a heat-treated coating with a solvent to obtain the pattern.

10. **(Original)** The method as set forth in claim 9, wherein ii) the partial heat-treatment is conducted by using a laser beam or an electronic beam.

11. **(Currently Amended)** The method as set forth in claim 6, wherein the method comprises i) preparing a mold or a stamp with a fine pattern and ii) injecting or coating the organometallic precursor ~~of claim 1~~ or the composition ~~of claim 5~~ into the mold or on the stamp, transferring the organometallic precursor or composition onto a predetermined substrate, and heat-treating the transferred organometallic precursor or composition.

12. (New) An organometallic precursor represented by following Formula 1, for forming a metal film or pattern:

Formula 1



{wherein,

M is Co; L' is a ligand bonded to the metal comprising at least one donor atom selected from the group consisting of N, As, O, S, Se or Te or L' is a phosphite or phosphine oxide;

X is an anion that may coordinate the transition metal;

m is an integer of 1 to 10, provided that when m is two or more, each M may or may not be same as each other;

p is an integer of 0 to 40, and q is an integer of 0 to 10, provided that when p or q is two or higher, L's or Xs are independently identical or different with one another, and p and q are not 0 at the same time; and

L is a hydrazine compound coordinating the transition metal, represented by following Formula 2:

Formula 2



[wherein,

R_1 , R_2 , R_3 and R_4 are independently hydrogen; alkyl or aryl of 1 to 20 carbon atoms having at least one substitution group; or $R_5 \overset{\text{O}}{\underset{\text{||}}{\text{C}}} -$, provided that the at least one substitution group is selected from the group consisting of halogen, amine, hydroxyl, -SH(sulphydril), cyano, sulphonic acid (SO_3H), $\text{R}_6\text{S}-$, $\text{R}_6\text{O}-$ (R_6 is an alkyl or aryl group containing 1 to 20 carbons), $R_5 \overset{\text{O}}{\underset{\text{||}}{\text{C}}} -$, and nitrile, and R_5 is R' , $\text{R}'_2\text{N}$, or $\text{R}'\text{O}$ (R' is hydrogen, or an alkyl or aryl group containing 1 to 20 carbons)]; and

n is an integer of 1 to 40, provided that when n is two or more, Ls are independently

identical or different with one another}.

13. (New) The organometallic precursor as set forth in Claim 2, wherein the at least one donor atom is selected from the group consisting of N, P, As, O, S, Se, or Te; the halide is F^- , Cl^- , Br^- , or I^- ; the tetraalkylborate is BR_4^- wherein R is Me, Et or Ph; and the tetrahaloborate is BX_4^- , wherein X is F or Br.

14. (New) The method as set forth in claim 8, wherein the solvent is selected from the group consisting of acetonitrile, propionitrile, pentanenitrile, hexanenitrile, heptanenitrile, isobutylnitrile, hexane, heptane, octane, dodecane, anisole, mesitylene, xylene, methyl isobutyl ketone, 1-methyl-2-pyrrolidinone, cyclohexanone, acetone, tetrahydrofuran, diisobutyl ether, isopropyl ether, ethyl acetate, butyl acetate, propylene glycol methyl ether acetate, isopropyl alcohol, butyl alcohol, hexyl alcohol, octyl alcohol and a mixture thereof.